UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 5

DATE:

SUBJECT: Technical Review of Phase II Ozone Attainment Demonstrations for Illinois, Indiana, and Wisconsin

FROM: Edward Doty, Environmental Scientist
Regulation Development Section, APB, ARD

TO: Docket

Attached is the Technical Support Document for rulemaking on three Phase II ozone attainment demonstrations submitted by the States of Illinois, Indiana, and Wisconsin. These attainment demonstrations address attainment of the one-hour ozone standard in the severe ozone nonattainment areas surrounding Lake Michigan and in an ozone modeling domain containing these severe ozone nonattainment areas along with some areas designated as attainment for ozone.

The Technical Support Document concludes that the Environmental Protection Agency should proceed with rulemaking to propose conditional approval of the States' ozone attainment demonstrations with the exceptions of mobile source emission conformity budgets. The States have selected two possible emission control strategies which could lead to attainment of the ozone standard, depending on the outcome of regional reductions in oxides of nitrogen required under a November 7, 1997 state implementation plan call. The States will not finalize the selection of the emission control strategy, the ozone attainment demonstration, and associated emission control regulation development until December 2000.

The States have not selected mobile source emission budgets (conformity budgets) that are supported by or compatible with a finally adopted ozone attainment demonstration/control strategy. Therefore, it is recommended that the Environmental Protection Agency propose disapproval of the States' conformity budgets for the ozone nonattainment areas within the Lake Michigan ozone modeling domain.

Attachment

standard bcc's: official file copy w/ attachment(s)
originator's file copy w/ attachment(s)
originating organization reading file w/ attachment(s)

other bcc's: Randy Robinson
Victoria Hayden
Phuong Nguyen

ARD:APB:RDS (IL/IN/OH):Doty
A:\phas2prf.wpd

ATTACHMENT

TECHNICAL SUPPORT DOCUMENT FOR RULEMAKING ON THE PHASE II OZONE ATTAINMENT DEMONSTRATIONS FOR ILLINOIS, INDIANA, AND WISCONSIN

I. EXECUTIVE SUMMARY

What is the purpose of this technical support document?

This technical support document:

- reviews ozone attainment demonstrations submitted by Illinois, Indiana, and Wisconsin against requirements of the Clean Air Act and requirements and guidelines published by the Environmental Protection Agency; and
- recommends the most appropriate rulemaking action.

What is the purpose of these submittals?

The submittals document ozone modeling and other analyses conducted to support a demonstration of attainment of the one-hour National Ambient Air Quality Standard for ozone (one-hour ozone standard)[1], in compliance with section 182(c)(2)(A) of the Clean Air Act.

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[1] The one-hour ozone standard is 0.12 parts per million (120 parts per billion {ppb}) and is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 parts per million is equal to or less than 1 at all monitoring sites within an area. To assess the attainment status of an area, the 3 most recent years of air quality data are generally considered. The expected number of exceedances takes into consideration the number of days with missing peak hourly ozone data as well as the number of days with actual monitored ozone standard exceedances. 40 CFR Part 50.9 and 40 CFR Part 50 Appendix H.

What areas are covered by the submittals?

The submittals discuss observed and modeled ozone concentrations in a modeling grid whose base (modeling domain) surrounds Lake Michigan. A modeling grid is a three-dimensional volume divided into cells and is used in this case to apply a photochemical model. A three-dimensional grid is also useful in the visualization of phenomena which are three dimensional in nature, such as the formation and transport of ozone downwind from a pollutant source area or the flow of air through a three dimensional volume. The submittals address attainment of the one-hour ozone standard in the Chicago-Gary-Lake County (Illinois and Indiana) and Milwaukee-Racine (Wisconsin) ozone nonattainment areas as well as in the remainder of the modeling domain.

Are the ozone attainment demonstrations technically acceptable?

The State submittals reviewed here have adequately documented the techniques and data used to conduct photochemical modeling in the Lake Michigan ozone modeling domain and have adequately summarized the results of the modeling analyses. The procedures and base data used in these analyses comply with Environmental Protection Agency guidelines.

The States have demonstrated that attainment of the one-hour ozone standard is achievable provided sufficient reductions in background ozone concentrations occur as the result of the implementation of regional Oxides of Nitrogen (NOx) emission controls. Such NOx emission controls are expected to occur as the result of the October 27, 1998 (63 FR 57356) Environmental Protection Agency NOx state implementation plan call. It is noted, however, that at the time of writing of this technical support document, the District of Columbia Circuit Court of Appeals has issued an indefinite stay against the NOx implementation plan call pending further action on other cases related to this plan call. It is unclear whether the regionwide NOx reductions will occur as expected in the State's Phase II attainment demonstrations. If the regionwide NOx emission reductions do not occur and if the States do not adopt additional emission control measures to compensate for the impacts of the emission reduction shortfall, it must be concluded that the attainment demonstrations as currently submitted would provide insufficient emission reductions and ozone air quality improvement to allow attainment of the one-hour ozone standard by the statutory deadline.

Due to uncertainty over the specific impacts of the NOx state

implementation plan revisions, Illinois, Indiana, and Wisconsin have not selected specific Volatile Organic Compound (VOC) and NOx emission control strategies to achieve attainment of the one-hour ozone standard. This will not be completed until the States submit a final ozone attainment demonstration in December 2000.

Until the States submit the final ozone attainment demonstrations in December 2000 and the Environmental Protection Agency has found these submittals to be acceptable, it must be concluded that the ozone attainment demonstrations reviewed here are not fully acceptable and fully approvable. It is recommended that the Environmental Protection Agency propose to conditionally approve the ozone attainment demonstrations. Full approval would not come until after the December 2000 submittals are reviewed and found to be approvable.

Do the submittals comply with the Clean Air Act requirements and with the Environmental Protection Agency guidelines?

As noted above, the submittals do not fully comply with Clean Air Act requirements in that they do not identify a specific adopted emission control strategy adequate to attain the one-hour ozone standard by the statutory deadline, November 15, 2007. It should also be noted that the States have yet to adopt NOx emission control regulations compliant with the NOx state implementation plan call. Since attainment of the ozone standard, as discussed in the submittals, is also contingent upon such emission control measures, it must be concluded that the States have not fully demonstrated attainment of the one-hour ozone standard until the States have also adopted NOx emission control measures compliant with the NOx state implementation plan call. Approval of the ozone attainment demonstration should be made contingent on the States adopting acceptable NOx emission control regulations and on a demonstration of compliance with the NOx state implementation plan call.

As noted later in this review, the States did not include transportation conformity emission budgets consistent with the attainment demonstrations. The Environmental Protection Agency has not finalized policy on how to address this situation in rulemaking. If the Environmental Protection Agency decides to disapprove ozone attainment demonstrations on this basis, it is recommended that this disapproval be constrained to a partial disapproval of the ozone attainment demonstration. It should be noted that the ozone attainment demonstration itself in no way is dependent on the selection of a transportation emission budget. The transportation emission budget, however, does depend on the

future emissions considered in the attainment demonstration. The States can not be expected to finalize the attainment demonstration-based transportation emission budget until after the ozone attainment demonstrations are finalized in December 2000.

The States have failed to comply with sections 172(c)(9) and 182(c)(9) of the Clean Air Act by failing to include specific contingency measures in the attainment demonstration submittals that would be undertaken if an ozone nonattainment area fails to attain the ozone standard by the statutory deadline or if other milestones of the Clean Air Act are missed. Such measures are to take effect without further action by the State or by the Environmental Protection Agency. Therefore, the contingency measures must be adopted as part of the state implementation plan and either be early implemented or triggered by a milestone failure (including failures to meet rate-of-progress requirements or to attain the ozone standard by the statutory deadline) with an implementation date certain following triggering. It is assumed that the States can adopt such contingency measures as part of the December 2000 submittals.

Are the submittals approvable and what are the suggested rulemaking actions?

It is recommended that the Environmental Protection Agency propose to conditionally approve the ozone attainment demonstrations. The full approval of the ozone attainment demonstrations would be contingent on the submittal and approval of the final ozone attainment demonstrations to be submitted in December 2000. The approval of the attainment demonstrations should be contingent on the States adopting contingency measures in compliance with sections 172(c)(9) and 182(c)(9) of the Clean Air Act. Additionally, the approval of the attainment demonstrations should be made conditional on the future status of the Environmental Protection Agency NOx state implementation plan call and on the actual air quality impacts of the States' NOx state implementation plans, or on the selection and adoption of additional compensating emission controls in the case of NOx emission reduction shortfalls and shortfalls in background ozone improvement.

Further consideration must be given to how to address transportation conformity issues in this submittal. At the time of the writing of this technical support document, the Environmental Protection Agency had not issued final policy on this issue. It is noted that this issue should be resolved one

way or another before the Environmental Protection Agency completes final rulemaking on the States' ozone attainment demonstrations.

II. TECHNICAL REVIEW OF THE SUBMITTALS

A. BACKGROUND INFORMATION

What are ozone precursors, and what are the sources of these precursors?

Ozone near the Earth's surface is a pollutant for which the Environmental Protection Agency, through the Clean Air Act, has established a health-based standard. Ozone is not directly emitted into the air by most pollution sources, but is formed chemically in the air through the reactions of ozone precursors in the presence of sunlight. The ozone precursors that participate in this chemical process are Volatile Organic Compounds (VOC), Oxides of Nitrogen (NOx), and Carbon Monoxide (CO) (CO is a minor ozone precursor, and is of no further interest in this technical support document). Ozone formation is accelerated or enhanced under certain meteorological conditions, such as high temperatures and low wind speeds. Higher ozone concentrations occur downwind of areas with relatively high VOC and NOx concentrations or in areas subject to relatively high background ozone and ozone precursor concentrations (ozone and ozone precursors entering an area as the result of transport from upwind source areas).

Since the most important ozone precursors are VOC and NOx, most State ozone control plans focus on the analysis of the emissions of these pollutants and on the control of these emissions to achieve the desired ozone concentrations. Most prior State ozone control plans have concentrated on the control of VOC emissions in ozone nonattainment areas. This emissions control strategy is now shifting to the control of local VOC emissions and of NOx emissions on a regional basis, as explained elsewhere in this technical support document.

VOC emissions are produced by a wide variety of sources,

including stationary and mobile sources. Significant stationary sources of VOC include industrial solvent usage, various coating operations, industrial and utility combustion units, petroleum and oil storage and marketing operations, chemical manufacturing operations, personal solvent usage, etc.. Significant mobile sources of VOC include on-road vehicle emissions, farm machinery usage, airplane emissions in the lower atmosphere, locomotive emissions, use of motorized lawn care and garden implements, and off-road vehicle emissions.

NOx emissions are produced primarily through combustion processes, including industrial and utility boiler use, cement kiln emissions, on-road and off-road vehicle emissions, farming and gardening equipment usage, stationary internal combustion engines, and airplane and locomotive emissions.

What is the ozone attainment status of the area covered by the submittals?

The submittals reviewed here cover attainment of the one-hour ozone standard in the entire ozone modeling domain surrounding Lake Michigan. The analyses focus on attainment of the ozone standard in the Chicago-Gary-Lake County and Milwaukee-Racine ozone nonattainment areas. The Chicago-Gary-Lake County ozone nonattainment area is composed of Cook, DuPage, Kane, Lake, McHenry, and Will Counties, and Aux Sable and Goose Lake Townships in Grundy County and Oswego Township in Kendall County within Illinois, and Lake and Porter Counties within Indiana. The Milwaukee-Racine ozone nonattainment area is composed of Kenosha, Milwaukee, Ozaukee, Racine, Washington, and Waukesha Counties in Wisconsin. Both of these ozone nonattainment areas are classified as severe-17 nonattainment for ozone under the one-hour standard and Clean Air Act, meaning that the areas have until November 15, 2007, to attain the one-hour ozone standard. The remainder of the modeling domain is designated as attainment for the one-hour ozone standard.

How does the revised ozone standard affect the submittals?

On July 18, 1997 (62 FR 38856), the Environmental Protection Agency promulgated (adopted through final rulemaking) a revised ozone standard. This revised ozone standard replaces the one-hour standard with an eight-hour standard at a level of 0.08 parts per million (ppm). The revised ozone standard is violated when the three-year average of the annual fourth highest daily eight-hour concentrations at any monitoring site in an area

exceeds 0.084 ppm.

On July 16, 1997, the President signed a memorandum directing the Environmental Protection Agency in the implementation of the revised ozone standard (as well as in the implementation of a revised particulate matter standard) and in the implementation of the requirements for the one-hour ozone standard. This memorandum requires the States to continue with the implementation of the one-hour ozone standard Clean Air Act requirements in any area until it has been demonstrated that the area has attained the one-hour standard based on three years of ozone data.

Since the Chicago-Gary-Lake County and Milwaukee-Racine ozone nonattainment areas continue to violate the one-hour ozone standard, they are still subject to the Clean Air Act requirements for the one-hour ozone standard. The submittals reviewed here addressed the Clean Air Act requirements for an ozone attainment demonstration.

It should be noted that, on May 14, 1999, the District of Columbia Circuit Court of Appeals ruled to prevent the Environmental Protection Agency from implementing or enforcing requirements directed at attaining the eight-hour ozone standard. The eight-hour ozone standard, however, was not overturned. This action has little or no impact on the results of the technical review discussed in this technical support document.

B. SUMMARY OF STATE SUBMITTALS

1. General Information

When were the Phase II ozone attainment demonstrations submitted to the United States Environmental Protection Agency?

All three States, Illinois, Indiana, and Wisconsin, submitted their Phase II ozone attainment demonstrations on April 30, 1998.

Why are there Phase I submittals and Phase II submittals, and what are the differences between the two types of submittals?

As noted below in the discussion of Environmental Protection Agency policy, on March 2, 1995, the Environmental Protection Agency put forward new policy regarding ozone attainment demonstrations. This policy recognized that States were

experiencing difficulties demonstrating attainment of the one-hour ozone standard due to ozone transport. The policy established a two phased process for demonstrating attainment of the ozone standard. Under Phase I, States were to submit modeling analyses with interim assumptions about ozone transport levels and future changes in these transport levels. Under Phase II, States were to use the results of a regional ozone analysis and regional ozone control strategy to refine the estimates of the current and future ozone transport levels and to select additional local controls needed to attain the one-hour ozone standard.

In May and June 1996, the States of Illinois, Indiana, and Wisconsin submitted a five volume set of technical documents to cover the Phase I submittal requirement. This Phase I submittal provides much of the technical information later incorporated by reference into the Phase II submittals.

Although the Phase I submittals themselves are not reviewed here for subsequent rulemaking, the data contained in the submittals are still relevant for the Phase II submittals. Therefore, the following review continues to refer to the Phase I submittals for background and supporting information.

Phase II of the attainment demonstration process called for a two-year consultative process between many eastern States to assess national and regional strategies to address the reduction of ozone transport in the eastern United States. This regional consultation and analysis process became known as the Ozone Transport Assessment Group (OTAG) process or simply OTAG.

Based on the OTAG modeling results and recommendations to the Environmental Protection Agency, the Phase II submittals contain refined or updated assumptions concerning the ozone and ozone precursor transport into the Lake Michigan ozone modeling domain. As noted below, the Phase II submittals are not the final ozone attainment demonstration for the Lake Michigan area. The final attainment demonstration is not expected until December 2000.

When were the submittals addressed in public hearings, and when were the submittals formally adopted by the States?

The States held public hearings on the Phase II attainment demonstrations on the following dates: Illinois (March 25, 1998); Indiana (April 6, 1998); and Wisconsin (April 24, 1998). All three States included evidence in their submittals that the public was notified of these hearings. Illinois and Indiana also

included transcripts from these hearings.

What are the basic components of the submittals?

Since all three States have participated in the Lake Michigan Ozone Study and the Lake Michigan Ozone Control Program, and since these ozone modeling studies form the technical basis for the ozone attainment demonstrations, all three States centered their ozone attainment demonstrations around a technical support document (February 1998 draft) produced by the four States in the Lake Michigan Air Directors Consortium (LADCO) (Along with Illinois, Indiana, and Wisconsin, Michigan is also a member of LADCO). This technical support document is entitled “Modeling Analysis for 1-Hour Ozone NAAQS in the Lake Michigan Area.” Each State has also included a state-specific cover letter and state-specific synopsis of the ozone attainment demonstration.

What Clean Air requirements and Environmental Protection Agency guidelines apply to the submittals?

The requirement for ozone attainment demonstrations based on photochemical modeling is contained in section 182(c)(2) of the Clean Air Act. This section requires States with ozone nonattainment areas classified as serious or above to develop and submit air quality plans based on the use of photochemical dispersion models on or before November 15, 1994.

Sections 172(c)(9) and 182(c)(9) of the Clean Air Act require the state implementation plans to include contingency measures to be implemented in the event of milestone failures. Milestone failures include failure to meet rate-of-progress emission levels, failure to attain standards by statutory deadlines, and failures to meet other Clean Air Act milestones. If milestones are missed, the contingency measures must be implemented without the need for further action (generally additional rule development or rulemaking) by the States and by the Environmental Protection Agency. For the attainment demonstration, it is required that the state implementation plan submittal include the contigency measures to be implemented in the event that the ozone standard is not attained by the statutory deadline.

The following documents contain the Environmental Protection Agency guidelines affecting the development and review of ozone modeling and attainment demonstrations for serious and above nonattainment areas.

a. Guideline for Regulatory Application of the Urban Airshed Model, EPA-450/4-91-013, July 1991;

b. Memorandum, Subject: "The Ozone Attainment Test in the State Implementation Plan (SIP) Modeling Demonstrations," from Joseph A. Tikvart, Office Of Air Quality Planning and Standards, Environmental Protection Agency, December 16, 1992;

c. Guidance on Urban Airshed Model (UAM) Reporting Requirements for Attainment Demonstrations, EPA-454/R-93-056, March 1994.

d. Memorandum, Subject: "Ozone Attainment Dates for Areas Affected by Overwhelming Transport," from Mary D. Nichols, Assistant Administrator for Air and Radiation, Environmental Protection Agency, September 1994;

e. Memorandum, Subject: "Ozone Attainment Demonstrations," from Mary D. Nichols, Assistant Administrator for Air and Radiation, Environmental Protection Agency, March 2, 1995;

f. Guidance on the Use of Modeled Results to Demonstrate Attainment of the Ozone NAAQS, EPA-454/B-95-007, June 1996; and

g. Memorandum, Subject: "Guidance for Implementing the 1-Hour Ozone and Pre-Existing PM10 NAAQS," from Richard Wilson, Office of Air and Radiation, Environmental Protection Agency, December 1997.

The following summarizes key guidance and requirements taken from the above documents.

a. Guideline for Regulatory Application of the Urban Airshed Model, EPA-450/4-91-013, July 1991.

- This guidance covers the original (subsequent guidelines discussed below have significantly modified portions of the guidance contained in this guideline) guidelines for the development of ozone modeling analyses and ozone attainment demonstrations.

The guidelines described: establishment of analysis protocols; modeling episode selection; model validation procedures and criteria; and minimum attainment demonstration requirements.

- The attainment demonstration requirements, subsequently modified, required that the modeled attainment strategy should lead to no modeled exceedances of the one-hour ozone standard in any modeled grid cells, for all time periods modeled.

b. Memorandum, "The Ozone Attainment Test in the State Implementation Plan (SIP) Modeling Demonstrations," December 16, 1992.

- The guidance confirms that the target peak ozone concentration for modeled ozone attainment demonstrations is 120 parts per billion, one-hour averaged. This peak ozone concentration must be achieved throughout the ozone modeling domain for all days modeled. A target ozone concentration level exceeding 120 parts per billion would not be acceptable.

c. Guidance on Urban Airshed Model (UAM) Reporting Requirements for Attainment Demonstration, EPA-454/R-93-056, March 1994.

- The guidance identifies seven broad areas which must be addressed in the ozone modeling documentation:

  i. modeling protocol used to plan for the selection of modeling approaches, input data required, geographical area modeled, high ozone periods modeled, and modeling validation test procedures;

  ii. emission inventory preparation procedures and results;

  iii. air quality and meteorological data input preparation and results

  iv. modeling diagnostic tests performed to improve model performance;

v. model validation performance results;

vi. modeled emission control measure impacts and air quality simulation results corresponding with the selected attainment strategy; and

vii. methods used for accessing input and output data files of the modeling system.

- Table 1 of the guidance outlines the required documentation components and the issues to be addressed in each document component.

- A modeling protocol was developed and adopted by Illinois, Indiana, Michigan, and Wisconsin at the start of the Lake Michigan Ozone Study. The March 1994 modeling documentation guidance notes that any revisions made to the protocol subsequent to its adoption should be documented in the protocol and addressed in the executive summary of the State Implementation Plan submittal.

- The submitted modeling documentation should identify the problems encountered during the modeling process as well as deviations from Environmental Protection Agency guidelines.

- The following information should be documented in the ozone attainment demonstration.

  - ✦ Sources of meteorological data and the quality assurance checks made on the data obtained from these sources.

  - ✦ Sources of air quality data and the quality assurance checks made on the data obtained from these sources.

  - ✦ Modeling domain boundary conditions as a function of time for each modeled high ozone period. The boundary conditions are the pollutant concentrations along the boundary of the modeling domain.

  - ✦ Modeling domain initial conditions for each modeled high ozone period. The initial

conditions are the initial air quality and meteorological conditions in each grid cell at the start of a modeled high ozone period.

- ✦ Methods used to develop future boundary and initial conditions.

- ✦ Maps indicating the locations of meteorological stations and air quality monitors with county boundaries annotated.

- ✦ Methods and base data used to derive time-specific wind fields.
- ✦ Methods and base data used to derive time-specific mixing heights and the upper air stations used as sources of base input data. Mixing heights are the thicknesses of the near-surface layer in which pollutants and other air components are mixed well in the vertical direction.

- ✦ Graphics illustrating patterns of wind fields, temperatures as a function of time and location, mixing heights, etc., through each modeled episode day.

- ● The documentation should summarize the diagnostic analyses and sensitivity analyses, including quality assurance checks, used to test the modeling system and input data files.

- ● A qualitative understanding of ozone formation and transport in the modeling domain must be demonstrated in the modeling documentation.

- ● The documentation must describe the modeling system's performance through the use of both graphical and statistical measures.

d. Memorandum, Subject: "Ozone Attainment Dates for Areas Affected by Overwhelming Transport," from Mary D. Nichols, Assistant Administrator for Air and Radiation, Environmental Protection Agency, September 1, 1994.

- ● This policy notes that, for areas that are affected by overwhelming ozone (and ozone

precursor) transport from upwind areas with higher ozone nonattainment classifications, it is reasonable to temporarily suspend the attainment date for these areas. This policy, however, does not relieve an affected downwind area from meeting requirements under the Clean Air Act based on its own current ozone nonattainment classification.

- The State with an affected area must demonstrate through ozone modeling that the subject area is affected by overwhelming ozone transport, making it impossible for the area to attain the ozone standard by the statutory deadline associated with its ozone nonattainment classification. The modeling must also support a new attainment date for the area. The new attainment date may not extend beyond the attainment deadline of the upwind source area.

e. Memorandum, Subject: "Ozone Attainment Demonstrations," from Mary D. Nichols, Assistant Administrator for Air and Radiation, Environmental Protection Agency, March 2, 1995.

- This memorandum provides guidance on an alternative approch to provide States flexibility in their planning efforts for ozone nonattainment areas classified as serious and above. The guidance applies to areas significantly affected by ozone transport.

- The memorandum recognizes that it would be difficult for areas significantly affected by ozone transport to develop attainment demonstrations by the Clean Air Act required submittal date of November 15, 1994 (a number of States had already failed to make such submittals due to this problem by the date of this memorandum). The memorandum established a two-phased approach to the development and submittal of attainment date submittals. Under Phase I, States were to submit a plan to implement, by May 1999, a set of specific emission control measures (including sufficient emission reductions to achieve a 9 percent post-1996 rate-of-progress emission reduction to satisfy rate-of-progress requirements through November 1999).

Phase I state implementation plan submittals were to include either ozone modeling with interim assumptions about future ozone transport or modeling that shows attainment base on an assumed boundary condition. These submittals also had to include an enforceable commitment to:

- ★ participate in a consultative process to address regional ozone transport (this became the OTAG process);
- ★ adopt additional local emission control measures as necessary to attain the ozone standard, meet rate-of-progress requirements, and eliminate significant downwind ozone transport; and
- ★ identify any emission reductions that are needed from upwind areas to allow the affected downwind area to attain the ozone standard.

The Phase I submittal was also required to specify the schedule for completing adoption of the additional rules needed to reach attainment of the one-hour ozone standard.

Phase I submittals had to be adopted as state implementation plan submittals. It should be noted, however, that the Environmental Protection Agency has not ruled on these submittals to formally incorporate them into the state implementation plan.

- The March 2, 1995 policy noted that Phase II of the revised attainment demonstration approach would begin with a two year process, ending at the close of 1996 (it actually did not close until 1997), to assess regional emission control strategies and refine local emission control strategies to take into account potential regional control strategies. If an agreement on regional emission control strategies could not be reached by the end of 1996, the Environmental Protection Agency intended, by the end of 1997, to use its authority under sections 126 and 110 of the Clean Air Act to work with all affected States to ensure

that the required regional emission reductions were achieved (this led to the 1998 NOx state implementation plan call).

Based on the results of the two year regional emissions control study, States were expected to submit revised, final ozone attainment demonstrations by mid-1997 to demonstrate attainment of the ozone standard through the use of local and regional emission reductions. Emission control rules sufficient to attain the ozone standard were to be submitted to the Environmental Protection Agency no later than the end of 1999.

f. <u>Guidance on Use of Modeled Results to Demonstrate Attainment of the Ozone NAAQS</u>, EPA-454/B-95-007, June 1996.

- This guidance document revised the ozone demonstration of attainment policy. Prior ozone attainment demonstration policy required that the modeled future ozone concentrations show no exceedances of the ozone standard anywhere in the modeling domain or for any modeled period. This test has been determined to be overly restrictive due to its incompatibility with the ozone standard and the uncertainties associated with the photochemical modeling process.

  The revised policy contained in this guidance document allows some modeled exceedances depending on the severity (ozone conduciveness) of the modeled days. The policy lays out two modeling approaches for demonstrating attainment of the ozone standard. The first approach (the "Statistical Approach") combines a statistical test with a weight of evidence determination. The second approach (the "Deterministic Approach") combines a deterministic test with a weight of evidence determination.

- Besides describing the two analysis approaches, the guidance specifies the factors affecting weight of evidence considerations and acceptance of modeling results indicating peak ozone concentrations slightly above the ozone standard.

Sufficient weight of evidence can be used to demonstrate that attainment of the ozone standard is likely even though some potential ozone standard exceedances have been modeled.

- The guidance requires a 3-stage analysis process: the Phase II analysis; a mid-course review (circa 1999-2001); and third review of air quality and emissions data at or shortly before the statutory attainment date for severe ozone nonattainment areas (circa 2004-2006). The subsequent analyses are needed to fine tune the attainment emissions control strategy.

g. Memorandum, Subject: "Guidance for Implementing the 1-Hour Ozone and Pre-Existing PM10 NAAQS," from Richard Wilson, Office of Air and Radiation, Environmental Protection Agency, December 1997.

- This memorandum discusses a number of implementation issues related to the one-hour ozone standard. With regard to one-hour standard attainment demonstrations, this policy concludes that, because the Ozone Transport Assessment Group assessment was delayed for approximately 9 months, the Environmental Protection Agency believed that the States should have until April 1998 to submit attainment demonstrations. The submittals had to give evidence that all measures and regulations required to achieve attainment had been adopted and implemented or were on an expeditious schedule to be adopted and implemented. For severe and higher classified ozone nonattainment areas, the April 1998 submittals had to contain a commitment to submit a plan on or before the end of 2000 which contains: (i) target calculations for post-1999 rate-of-progress milestones up to the attainment date; and (ii) adopted regulations needed to achieve the rate-of-progress milestones and to attain the one-hour ozone standard.

2. Modeling Procedures and Basic Input Data

What modeling approach was used in the analyses?

All three States, as members of LADCO and as participants in the Lake Michigan Ozone Study and Lake Michigan Ozone Control Program, used the same ozone modeling approach. The modeling approach is documented in an April 1998 technical support document, entitled “Modeling Analysis For 1-Hour Ozone NAAQS In The Lake Michigan Area” (the State of Indiana, as part of the Phase II submittal, relied on and submitted a February 1998 draft version of the modeling technical support document). The version reviewed here is the final April 1998 version. Since the April 1998 technical support document failed to document all of the modeling approaches and bases for the development and selection of model input data, this review also relies on the Phase I submittal, which does a more thorough job of documenting the system and input data.
The heart of the modeling system and approach is the Urban Airshed Model - Version V (UAM-V) developed originally for application in the Lake Michigan area. This photochemical model was used to model ozone and ozone precursors in a multiple, nested grid system. In the horizontal dimension, three nested grids are used. Grid A, the largest of the three grids, is a 35 cell by 50 cell grid (560 kilometers east-west by 800 kilometers north-south) generally centered on Lake Michigan with a horizontal resolution of 16 kilometers per cell. Grid B is a 34 cell by 60 cell grid (272 kilometers east-west by 480 kilometers north-south) centered on the lower three-quarters of Lake Michigan with a horizontal resolution of 8 kilometers per cell. Grid B covers all of the one-hour ozone nonattainment areas of interest in the analysis. Grid C is a 20 cell by 80 cell grid (80 kilometers east-west by 320 kilometers north-south) approximately centered on the western shoreline of lower Lake Michigan with a horizontal resolution of 4 kilometers per cell. The model covered 8 vertical layers over the entire horizontal modeling domain. Mixing heights used in the modeling system were determined from regional upper-air monitoring station data.

Besides being able to model ozone and other pollutants in nested horizontal grids, UAM-V can also model individual elevated source plumes within the modeling grid (plume-in-grid or PiG). Gaussian dispersion models were used to grow plumes until the plumes essentially filled grid cells. At these points, the numerical dispersion and advection components of UAM took over to address further downwind dispersion and advection.

The UAM-V modeling system was also used to assess the impacts of clouds on certain high ozone episode days. Observed cloud data were used to modify chemical photolysis rates and other

meteorological input data.

The following input data systems and analyses were also used as part of the combined modeling system:

Emissions

UAM-V required the input of a regional emissions inventory of gridded, hourly estimates of CO, NOx, and speciated VOC emissions (speciated based on carbon bond types). The States provided regional emission inventories, which were processed through the Emissions Modeling System - 1995 version (EMS-95) to prepare UAM-V input data files. Emission data files were generated for Grid A and Grid B.

For Grid B, the States supplied point (individually identified stationary sources) and area source (sources too small and numerous to be identified and recorded as individual sources) emissions for a typical summer weekday. These emissions were based on the States' 1990 base year emissions inventories for the ozone nonattainment areas and were adjusted to 1991 levels to be compatible with the high ozone periods modeled. The base emissions were adjusted for some source categories and to reflect typical "hot summer days." Day-specific emissions data were supplied by over 200 facilities in the modeling domain. Mobile source emissions were calculated by EMS-95 using MOBILE5a (a mobile source emissions model supplied by the Environmental Protection Agency) emission factors (using day-specific temperatures) and local vehicle-miles-traveled data generally supplied by local metropolitan planning agencies and based on transportation models. Finally, the biogenic emission rates used in Grid B were calculated based on BIOME, which is the biogenics emissions model contained within EMS-95.

For Grid A, point and area anthropogenic emissions rates were derived from Environmental Protection Agency's 1990 Interim Regional Inventory, except for Wisconsin, which supplied state-specific data. Mobile source emissions were based on MOBILE5a emission factors (derived for a representative hot summer day) and vehicle miles traveled data derived using the 1990 Highway Performance Monitoring System. Biogenic emission rates were calculated using the Biogenics Emissions Inventory System (BEIS) assuming temperatures for a representative, hot summer day. This version of BEIS includes soil NOx emissions and land use data from the United States Geological Survey

Grid B emissions data superceded Grid A data within Grid B. Grid

C emissions data were not specifically derived (Grid B emissions data were used within Grid C).

All emission estimates were specially, spatially, and temporally resolved into UAM-V input data files by the use of EMS-95.

Meteorology

Meteorological input data by grid cell and hour were generated by use of a prognostic meteorological model (model output data derived from equations which describe how meteorological variables, such as wind speed/direction, temperature, and water vapor change over time) known as CALRAMS. CALRAMS was run with varying horizontal resolution depending on location. Over Grids B and C, CALRAMS was run with 4 kilometer resolution. Over Grid A, a resolution of 16 kilometers was used. Over the remainder of the continental United States, a resolution of 80 kilometers was used. The model's vertical structure used 31 layers in Grid A and over the remainder of the continental United States outside of the UAM-V modeling domain and 26 layers over Grids B and C.

Four-dimensional data assimilation using observed meteorological data values was used to ensure that the model estimates did not deviate significantly from observed meteorological data. Preprocessor programs were used to map the model's output data into the UAM-V grid system and to derive other necessary model inputs.

Some adjustments were made to CALRAMS results where the model produced near-calm wind speeds and where observed wind speeds were significantly higher than modeled wind speeds during one modeled ozone episode.

Chemistry

Atmospheric chemistry within the modeling grid system and UAM-V was simulated using the Carbon Bond-Version IV model developed by the Environmental Protection Agency and used in Version IV of UAM.

Boundary and Initial Conditions

Initial sensitivity analyses of the modeling system's repsonse to modeling domain boundary conditions (incoming ozone and ozone precursor levels at the outer edges of the modeling domain) showed that the system was very sensitive to these boundary

conditions. The LADCO States used all available upwind data, and especially those collected during the 1991 intensive field study, to derive boundary conditions. In addition, the contractor, SAI, Incorporated, used output data from the use of the Regional Oxidant Model (ROM) to derive initial concentrations in the modeling domain for the first day of each modeled ozone episode. Data from this first day, along with other model input data, were used to model ozone and precursor concentrations for the next 1 to 2 days, to be used as inputs into the main part of the modeled ozone episode. The first 1 to 2 days modeled were treated as "ramp-up days" for the main part of each modeled ozone episode. This process produced more stable input for the modeling of high ozone days.

What high ozone periods were modeled?

Four high ozone episodes in 1991 were considered. These episodes were:

June 18-21, 1991;
June 24-28, 1991;
July 15-19, 1991; and
August 22-26, 1991.

The 1991 ozone episodes were selected as the focus of the modeling analyses because the summer of 1991 was a relatively conducive period for ozone formation, and, most importantly, because LADCO conducted an intensive field study during that summer to collect data needed to support the modeling study.

What procedures and sources of projection data were used to project the emissions to future years?

The future year emission inventories used in the Lake Michigan Ozone Control Program and ozone attainment demonstration were derived from the Lake Michigan Ozone Study base year regional inventory (discussed above). Three adjustments were made to the base year emissions inventory to generate the future year emission inventories. First, a baseline inventory was prepared by replacing the day-specific emissions with typical hot summer day emissions for point sources. Emissions for other source categories were simply carried over to the baseline inventory. Second, the baseline emissions inventory was projected to 2007 (the attainment year for severe ozone nonattainment areas) by

applying scalar growth factors. Finally, the projected baseline emission inventories were reduced to reflect the implementation of various emission control measures expected or required to occur by those years.

The growth factors used in the projection of emissions for each source sector are as follows:

- Point Sources:
  - for electric utilities - company-specific data were provided by each State
  - for certain individual point sources - a growth factor of “0" was used to reflect the shutdown of these sources
  - for all remaining point source emission categories - growth factors based on the Environmental Protection Agency Economic Growth Analysis System (EGAS) were used
- Area Sources:
  - for baseline emission estimates based on population - projected populations were used to recalculate emissions
  - for gasoline marketing source categories - projected emissions were based on projected gasoline sales
  - for other area source emission categories - projections were based on EGAS estimates (some EGAS estimates were judged to be inappropriate and alternative surrogates were used to estimate future emissions)
- Mobile Sources:
  - vehicle miles traveled projections were based on transportation modeling for northeast Illinois, northwest Indiana, and southeast Wisconsin, and on State-supplied growth factors for the rest of the ozone modeling domain
- Biogenic Sources - no growth was assumed.

To account for emission changes resulting from various emission controls (these emission controls also affect projected emissions), the States tested several emission control strategies. Emission reduction scalars were developed to reflect the expected or required emission reduction levels, rule penetration (accounting for the percentage of source category emissions affected by the emission reduction requirements), and rule effectiveness (some source control rules do not fully achieve the emission reductions expected due to control device failure, human error, or other factors). The base component of these control strategies were the emission reductions resulting from the controls mandated by the Clean Air Act and expected to be in place by 2007. These emission controls are further discussed below.

How were the emissions, air quality, and meteorological input data quality assured?

Emissions

The Lake Michigan States' quality assurance of the emissions data focused on the comprehensiveness and reasonableness of the emissions data rather than on precision and accuracy of the data. During the initial development of the regional emissions inventory, internal quality control activities included the preparation and implementation of quality assurance plans for the derivation of emission estimates by each State and for the development and application of the EMS-95 emissions software. External quality assurance activities included: (1) audits of the point and area source data inputs; (2) review of the EMS-95 output; and (3) independent testing of the EMS-95 model source code. The State emission estimates were compared against each other to assess their completeness, consistency, and reasonableness.

Several approaches were used to compare the emission estimates against ambient measurements. These included: (1) comparisons of ambient to emissions-based ratios of nonmethane organic compounds to oxides of nitrogen; (2) comparisons of ambient to emissions-based ratios of carbon monoxide to oxides of nitrogen; (3) receptor modeling (determining individual source shares of monitored pollutant concentrations based on source-specific emission profiles and temporal and spatial statistical analyses of monitored pollutant species); and (4) comparisons of ambient to model-based ratios of nonmethane organic compounds to oxides

of nitrogen. The comparison of the measurement-based pollutant ratios with the emissions-based pollutant ratios showed good agreement between the emissions inventory and the ambient data. The receptor modeling results also generally supported the validity of the emissions inventory.

Air Quality and Meteorological Data

Validation of the 1991 Lake Michigan Ozone Study field data (the data used as input to the meteorological and photochemical dispersion models and used to validate the models' outputs) was performed by the Lake Michigan Ozone Study Data Management and Data Analysis Contractors. The data were validated using a number of statistical analyses. Three levels of validation were used, depending on the intended use of the data. The three levels of data validation were:

- Level 1

  Performed by the group collecting the data. This group: flagged suspect data values; verified the data contained in computer data files against input data sheets; eliminated invalid measurements; replaced suspect data with data from back-up data acquisition systems; and adjusted measurement values to eliminate quantifiable calibration and interference biases;

- Level 2

  Performed on data assembled in a master data base. The level of data validation involved various consistency checks between data values within the data base, including: comparison of data from closely located sites collected at approximately the same time; comparison of data from co-located sampling systems; comparisons based on physical relationships; and special statistical analyses of the VOC and carbonyl data; and

- Level 3

  Performed by the Lake Michigan Ozone Study Data Analysis Contractor and performed as part of the data interpretation process. This validation included identification of unusual data values (e.g. extreme values, values which fail to track the values of other associated data in a time series, or those values which did not appear to fit the general and spatial or temporal overall pattern).

As a result of the data validation, several changes were made to the meteorological and air quality input data. Volume III (December 1995) of the Lake Michigan Ozone Study/Lake Michigan Ozone Control Program Project Report (submitted as the documentation for the Phase I attainment demonstration submittal) documents all of the data changes resulting from the data validation efforts.

3. Modeling Results

How did the States validate the photochemical modeling results?

A protocol document outlining the operational and scientific evaluation of the modeling system was prepared by LADCO, and was approved by the Environmental Protection Agency on March 6, 1992. The evaluation of the photochemical model consisted of seven steps:

(a) evaluation of the scientific formulation of the model by the Photochemical Modeling Contractor;

(b) assessment of the fidelity of the computer codes to scientific-formulation, governing equations, and numerical solution procedures performed by an independent contractor (independent of the Photochemical Modeling Contractor);

(c) evaluation of the predictive performance of the individual modeling process modules and preprocessor modules to identify possible flaws or systematic biases

(d) evaluation of the full model's predictive performance against statistical performance tests and performance criteria specified by the Environmental Protection Agency (see discussion of the model's performance for specific days modeled below);

(e) performance of sensitivity tests to assure conformance of the model with known or expected model behavior;

(f) performance of comparative modeling analyses, comparing the results from the use of UAM-V with similar results from the use of UAM-IV (the photochemical model generally recommended by the Environmental Protection Agency); and

(g) implementation of quality control and quality assurance activities, including: (i) benchmark modeling; (ii) pre-established file structuring; (iii) duplicative modeling; (iv) modeling procedure and results documentation; and (v) external review of modeling results.

Numerous modeling runs and overall system evaluations were conducted carry out these validation procedures.

What were the results of the model performance evaluations for the modeling system used in the attainment demonstration?

The following highlights the results of the operational and scientific evaluation of the modeling system. These results are discussed in detail in many documents generated by LADCO and supplied to the Environmental Protection Agency:

- Many modeling runs and evaluations of output data made to derive statistical results indicative of the modeling systems overall performance. Statistical data, such as: observed peak ozone concentrations versus peak predicted concentrations; unpaired peak concentration accuracy; bias in peak concentrations and overall system bias; and gross system error, were compared to acceptable system criteria specified by the Environmental Protection Agency (Guideline for Regulatory Application of the Airshed Model, EPA-450/4-91-013, July 1991). The statistical accuracy results for the modeling system comply with the Environmental Protection Agency performance criteria.

- The spatial and temporal representation of the surface ozone concentrations are reasonable both region-wide and in the areas of high concentrations. Broad areas of high ozone concentrations were reproduced successfully and magnitude and times of peak ozone concentrations reasonably matched those observed.

- Model performance across the full modeling domain was consistent with model performance in individual subregions. This further supports the credibility of the modeling system.

- Predicted aloft downwind ozone concentrations compare favorably with airborne/aircraft monitored ozone

concentrations. This supports the three-dimensional validity of the modeling system.

- Model performance for ozone precursors, especially for NOx, was very good. This further supports the validity of the use of the model to evaluate the impacts on ozone due to changes in precursor emissions and the testing of the emission control strategy scenarios.

Based on the model performance evaluation results, the Environmental Protection Agency approved the validity of the modeling system and its use for control strategy evaluations on December 15, 1994 (letter from John Seitz, Director of the Office of Air Quality Planning and Standards to Lake Michigan Air Directors Consortium).

What were the ozone modeling results for the base period and for the future attainment period?

Many modeling runs were conducted, producing millions of model output data. What is summarized here are the observed and modeled peak ozone concentrations for the selected ozone episode days. Prior to reading further in the response to this question, the reader is first referred to the discussion below concerning emission control strategy scenarios.

The ozone modeling system was run to simulate ozone concentrations on selected high ozone days for the base year and future year (2007). The future year simulations covered five boundary condition scenarios, base year boundary conditions, and reduction of peak boundary ozone levels to 85, 80, 70, and 60 parts per billion (ppb), one-hour avareage (the one-hour ozone standard is 120 ppb). The future year simulations also covered two emission control strategy sets, Strategy 2 and Strategy 4 (see the discussions of control strategies below).

The resulting domain-wide modeled peak ozone concentrations for Strategy 2 are given in Table 1. Similarly, the resulting domain-wide modeled peak ozone concentrations for Strategy 4 are given in Table 2.

Table 1
Lake Michigan Ozone Control Program
Strategy 2 Ozone Modeling Results
(Domain-wide Peak Ozone Concentrations, ppb)

1991 Date	1991 OBS	1991 MOD	2007 BY BC	2007 85 ppb	2007 80 ppb	2007 70 ppb	2007 60 ppb
June 26	175	165	141	134	133	128	122
June 27	118	152	130	123	122	119	114
June 28	138	142	123	118	118	116	109
June 20	152	137	123	121	121	120	120
June 21	134	126	---	---	---	---	114
July 17	145	148	133	126	124	120	113
July 18	170	162	146	135	135	128	119
July 19	170	161	145	137	137	129	119
Aug 25	148	128	126	121	120	116	109
Aug 26	189	158	142	135	131	124	115

OBS = Observed Peak Ozone Concentration
MOD = Modeled Base Year Peak Ozone Concentration
BY BC = Base Year Boundary Conditions

85 ppb, 80 ppb, 70 ppb, 60 ppb = Future Year Peak Ozone Boundary Concentrations

Table 2
Lake Michigan Ozone Control Program
Strategy 4 Ozone Modeling Results
(Domain-wide Peak Ozone Concentrations, ppb)

1991 Date	1991 OBS	1991 MOD	2007 BY BC	2007 85 ppb	2007 80 ppb	2007 70 ppb	2007 60 ppb
June 26	175	165	137	130	129	124	117
June 27	118	152	125	117	117	114	109
June 28	138	142	119	114	114	112	104
June 20	152	137	117	117	117	117	116
June 21	134	126	121	118	117	115	110
July 17	145	148	132	123	121	116	110
July 18	170	162	141	131	129	123	115
July 19	170	161	140	131	129	123	114
Aug 25	148	128	125	120	119	115	108
Aug 26	189	158	139	133	129	122	113

OBS = Observed Peak Ozone Concentration
MOD = Modeled Base Year Peak Ozone Concentration
BY BC = Base Year Boundary Conditions

85 ppb, 80 ppb, 70 ppb, 60 ppb = Future Year Peak Ozone Boundary Concentrations

Do the modeling results demonstrate attainment of the ozone standard?

The modeling of the Strategy 2 and Strategy 4 impacts by themselves (the 2007 BY BC columns in Tables 1 and 2) does not demonstrate attainment. The modeling supports the need for significant reductions in background ozone and ozone precursor concentrations. In addition, the model indicates the potential for ozone exceedances or ozone standard violations under the scenarios of smaller reductions in background ozone levels.

Does the attainment demonstration depend on future reductions of regional emissions?

As noted in the tables summarizing the peak modeled ozone concentrations above and in the discussion elsewhere in this technical support document, the States considered emission control strategies which by themselves would not achieve attainment of the one-hour ozone standard. The States, however, also show that, with a significant reduction in background ozone concentrations expected to result from the implementation of regional NOx emission controls under the NOx state implementation plan call, attainment of the standard can be achieved using the control strategies considered. Strategy 2 can lead to attainment of the ozone standard with a future reduction in peak ozone background concentrations down to 70 ppb. Strategy 4 can lead to attainment if peak background ozone concentrations are reduced to 80 ppb. The LADCO States document that these future ozone background concentration levels may be obtained through the implementation of the NOx emission controls required in the NOx state implementation plan call. The Wisconsin April 30, 1998 attainment demonstration emphasizes the need for the Environmental Protection Agency to indeed maintain the level of emissions control indicated in the proposed NOx plan call (the final NOx plan call does maintain the emission reduction requirements discussed in the proposed NOx plan call).

It should be noted that the LADCO States not only considered lowered background ozone concentrations resulting from regional upwind emission controls, they also considered reductions in background ozone precursor concentrations. The States used various analyses to estimate the reductions in background ozone precursor concentrations associated with the assumed reductions in background ozone concentrations. This was primarily accomplished by considering available modeling data from the Ozone Transport Assessment Group (OTAG) process.

The following two step process was used to determine which of the tested boundary conditions correspond best to the boundary conditions that would be expected under the Environmental Protection Agency NOx state implementation plan call:

- The NOx emissions of the OTAG modeling domain were compared to the regional NOx emissions expected under the NOx state implementation plan call. Several emission control strategies considered in the OTAG process were assessed. It is noted that the state implementation plan NOx emissions fall between OTAG emission control strategy runs C and H.

- The boundary ozone concentration changes resulting from the selected OTAG strategy runs were then compared to the ozone boundary changes considered in the Lake Michigan Ozone Control Program modeling runs. The reduction of peak background ozone levels down to 70 ppb in the Lake Michigan Ozone Control Program was found to correspond best with the expected ozone changes considered under the selected OTAG emission control strategy runs C and H.

Based on this approach, it is assumed that the NOx state implementation plan will reduce peak background ozone levels to 70 ppb.

4. Application of Attainment Test and the Attainment Demonstration

What approach was used to demonstrate attainment of the ozone standard?

The LADCO States applied two approaches to review the results of emission control strategy modeling, supplementing them with modeling results from the OTAG process, to demonstrate attainment of the one-hour ozone standard. First, the States considered the modeling results through the use of a deterministic approach, and, second, the States considered a statistical approach.

a. Deterministic Approach

The deterministic approach to ozone attainment demonstrations, as defined in the Guidance on the Use of Modeled Results to Demonstrate Attainment of the Ozone NAAQS (June 1996), requires the daily peak one-hour ozone concentrations modeled for every grid cell (in the surface level) to be at or below the ozone standard for all days modeled. If there are modeled ozone standard exceedances in only a few grid cells on a limited number of days, this approach can still be used to demonstrate attainment of the ozone standard through the use of a weight-of-evidence analysis.

The States note that the deterministic test is passed for:

- Strategy 2 with future (2007) ozone boundary concentrations capped at 60 ppb; or
- Strategy 4 with future ozone boundary concentrations capped at 70 ppb.

The States note that the modeling results for other Strategy 2 and Strategy 4 scenarios (higher ozone boundary concentrations) do not appear to be close enough to the standard to warrant the use of weight-of-evidence analyses.

b. Statistical Approach

The States note that the statistical approach permits occasional ozone standard exceedances and reflects an approach comparable to the form of the one-hour ozone standard. Therefore, the States have also given this approach some attention.

Under the statistical approach, there are three benchmarks related to the frequency and magnitude of allowed exceedances and the minimum level of air quality improvement after emission controls are applied. All three benchmarks must be passed in the statistical approach, or if one or more of the benchmarks are failed, the attainment demonstration must be supported by a weight-of-evidence analysis.

i. Limits on the Number of Modeled Exceedance Days

This benchmark is passed when the number of modeled exceedances days in each subregion is less than 3 or N-1 (N is the number of severe days), whichever is less. To determine the number of severe days, the States concluded

that a day is severe if there are at least two nonattainment areas within the modeling domain with observed one-hour peak ozone concentrations greater than the corresponding ozone design value (generally the fourth highest daily peak one-hour ozone concentration at a monitor during a three year period) during the 1990 through 1992 period. The States conclude that only two modeled days, June 26 and August 26, 1991, are severe ozone days. Therefore, N is 2.

Based on a review of the modeled daily peak ozone concentrations, the States conclude that Strategy 2 with a maximum background ozone concentration of 60 ppb and Strategy 4 with a maximum background ozone concentration of 70 ppb would clearly pass this benchmark test. They also conclude that Strategy 2 with a future maximum background ozone concentration of 70 ppb and Strategy 4 with a maximum background ozone concentration of 80 ppb would also pass the benchmark based on an additional weight-of-evidence demonstration. The weight-of-evidence demonstration is based on the following corroborative evidence:

- **Factors Providing Confidence in Modeled Results**

Evaluation of the modeling system's performance show that:

- ★ statistical measures for ozone comply with Environmental Protection Agency model performance criteria;
- ★ spatial and temporal patterns of monitored surface ozone concentrations are reproduced well by the modeling system on most days;
- ★ model performance for ozone across the full domain is consistent with the model performance in individual subregions;
- ★ aloft ozone predictions compare favorably with aircraft ozone data; and
- ★ model performance for ozone precursors, especially NOx, is very good.

Confidence in underlying data bases is high. A comprehensive field program was conducted during the summer of 1991. This field program was used to collect a large quantity of air quality and meteorological data to support

the photochemical grid modeling.
The modeling results obtained by the LADCO States were corroborated with the results from other modeling studies. As part of the Cooperative Regional Model Evaluation (CReME), the photochemical models UAM-IV, UAM-V, and SAQM were applied in the Lake Michigan region. The supplemental analyses shows that UAM-V produces results directionally consistent with those produced by UAM-IV and SAQM. All three models concurred in showing that VOC emission reductions are generally locally beneficial and that local NOx emission controls are not beneficial in certain locations and days, generally within 100 to 200 kilometers downwind of Chicago.

- **Severity of Modeled Episodes**

Three of the four ozone episodes modeled reflect meteorological conditions which typically favor high ozone in the Lake Michigan area (when the Lake Michigan area is on the “back-side” of a high pressure system with warm temperatures, high humidity, and south-southwesterly winds). The fourth episode is representative of warm temperatures with easterly winds, conditions which generally produce lower peak ozone concentrations and fewer ozone standard exceedances on a per year basis.

The magnitudes of the observed peak ozone concentrations at one or more locations within the modeling domain for the selected ozone episodes exceed the corresponding ozone design values for many locations within the region. This implies that the modeled ozone episodes are conservative and that attaining the ozone standard for these episodes should lead to attainment of the ozone standard in non-modeled episodes and during most future ozone conducive periods.

- **Trends Analyses**

Several trends analyses have been considered. First, 10-year trends established by the Environmental Protection Agency based on second high daily maximum one-hour ozone concentrations for each year show no significant changes in Chicago, Grand Rapids, Gary, and Kenosha; and a downward trend in Racine and Milwaukee. Second, 17-year trends based on the number of ozone exceedance days normalized based on the annual number of hot days show that the number of exceedance days is significantly decreasing relative to the

number of hot days each year. Third, 15-year trends show downward trends in ozone at sites on the western side of Lake Michigan.

Examination of limited morning total non-methane hydrocarbon concentration levels in Chicago and Milwaukee over the past 10 years show a significant downward trend. This downward trend is consistent with the calculated downward trend in VOC emissions.

The LADCO States conclude that the weight-of-evidence demonstration provides additional information which verifies the directionality of the modeling and demonstrates the potential stringency of the modeling results. The States conclude this information is sufficient to support minor exceptions to the benchmark, supporting a demonstration of attainment at the higher background ozone concentrations.

ii. Limits on the Values of Allowed Exceedances

Under this benchmark, the maximum modeled ozone concentration on severe days shall not exceed 130 ppb. The States, based on the modeled peak ozone concentrations, conclude this benchmark is passed for Strategy 2 with a maximum background ozone concentration of 70 ppb and for Strategy 4 with a maximum background ozone concentration of 80 ppb.

iii. Required Minimum Level of Air Quality Improvement

Under this benchmark, the number of grid cells with modeled peak ozone concentrations greater than 124 ppb must be reduced by at least 80 percent on each day with allowed modeled ozone standard exceedances. The States, based on the modeled peak ozone concentrations, conclude this benchmark is passed for Strategy 2 with a maximum background ozone concentration of 80 ppb and for Strategy 4 with a maximum background ozone concentration of 80 ppb.

From the above, it can be seen that benchmark i. is the most stringent of benchmarks in this case. Based on the statistical approach, the States conclude that Strategy 2 with a maximum background ozone concentration of 70 ppb or Strategy 4 with a maximum background ozone concentration of 80 ppb is sufficient to attain the one-hour ozone standard by 2007.

The States further conclude, based on both attainment demonstration approaches, that either Strategy 2 or Strategy 4 coupled with future year boundary conditions generally consistent with the impacts of the Environmental Protection Agency NOx state implementation plan call are sufficient to attain the one-hour ozone standard. The States, however, note that reliance on the impacts of the NOx state implementation call can not be construed as concurrence on the part of the States with the substance of the NOx state implementation plan call itself.

5. Emission Control Strategies

What emission control strategies were considered in the attainment demonstrations?

The LADCO States selected two emission control strategies considered during the Lake Michigan Ozone Control Program for further attainment demonstration modeling (numerous emission control measures were initially examined). The two strategies selected are referred to as Strategy 2 and Strategy 4. These emission control strategies would apply to the ozone nonattainment areas only and are summarized as the following:

- Strategy 2

  All national emission control measures mandated by the 1990 Clean Air Act amendments to be in place by 2007 and the State emission controls mandated to be in place by 1996, including the emission controls needed to comply with the requirements for 15 percent Rate-Of-Progress (ROP) plans. Additional ROP plans for the post-1996 period were not considered, and additional NOx emission controls, such as NOx Reasonably Available Control Technology, were not considered due to the existence of an approved NOx emission control waiver under section 182(f) of the Clean Air Act. Existing NOx emission reduction requirements, such as the acid rain control requirements under Title IV of the Clean Air Act, were considered.

- Strategy 4

  Strategy 4 includes all Strategy 2 measures and would also include some additional point, area, and mobile source control measures in the severe ozone nonattainment areas.

The additional controls reflect measures that could be given additional consideration. There have, however, been no evaluations of these possible control measures regarding their technical feasibility or cost-effectiveness. The measures have only been considered regarding their potential to reduce VOC and NOx emissions by 2007.

Table 3 lists the VOC and NOx emission reductions expected in Grid B and in the severe ozone nonattainment areas. Emissions control strategy components by State are listed in Tables 4.a through 4.c. The following acronyms are used:

RACT Reasonably Available Control Technology
NESHAP National Emission Standard for Hazardous Air Pollutants
MACT Maximum Available Control Technology
I/M Vehicle Inspection and Maintenance.

Table 3
Emission Control Levels From Strategies 2 and 4
Grid B and Severe Ozone Nonattainment Areas
Lake Michigan Ozone Modeling Domain

Strategy	Grid B Percent Emission Change		Severe Nonattainment Area Percentage Emissions Change	
	VOC	NOx	VOC	NOx
2	-27	-13	-37	-11
4	-40	-19	-53	-18

Table 4.a
Emission Control Measures for Illinois

STRATEGY 2 - 2007 MANDATORY CLEAN AIR ACT MEASURES

POINT SOURCE VOC MEASURES

Bakery RACT Tightening
Coke Oven NESHAP
Industrial Wastewater RACT
Volatile Petroleum Liquid and Volatile Organic Liquid Storage RACT
Metal Can Coating Tightening
Metal Furniture Coating Tightening
Offset Lithography RACT
Plant Shutdown Credits
RACT Fix-Ups for Several Source Categories
RACT Enhancement (Reduction of source size cutoff to 25 tons/year, potential to emit)
Synthetic Organic Chemical Manufacturing Industry Oxidation Tightening
Solid Waste Toxic Substance Disposal Facility MACT
Wood Furniture Coating RACT
Batch Processes RACT
Fabric Coating Tightening
Large Appliance Coating Tightening
Marine Vessel Loading
Metal Coil Coating Tightening
Miscellaneous Metal Parts Coating Tightening
Paper Coating Tightening
Plastic Parts Coating Tightening
RACT Geographic Expansion
Reformulated Gasoline for Bulk Terminals and Bulk Plants
Synthetic Organic Chemical Manufacturing Industry Reactor Processes
Vinyl Coating Tightening

POINT SOURCE NOx CONTROLS

Phase I Acid Rain NOx Limits

AREA SOURCE VOC CONTROLS

Automobile Refinishing
Architectural and Industrial Maintenance Coatings
Gasoline Tank Truck Leak Reductions (emission reduction due to use of reformulated gasoline)

Table 4.a continued

AREA SOURCE VOC CONTROLS

Stage II Vehicle Refueling Vapor Recovery
Underground Storage Tank Breathing Losses and Leaks
(emission reduction due to use of reformulated gasoline and improved valves)
Stage I Vapor Controls (emission reduction due to use of reformulated gasoline)
Traffic Marking Coatings
Commercial/Consumer Solvent Reformulation or Elimination
Off-Road Engine Standards
On-Board Vehicle Controls

MOBILE SOURCE CONTROLS

Tier I Light-Duty Vehicle Standards
Reformulated Gasoline - Phase II (Class C)
Enhanced I/M (no NOx cut-points)
Clean Fuel Fleets
Current Transportation Improvement Program/Build Scenario
Highway System and Public Transit System (including major new facilities included in the 2010 Plan)
Conventional Transportation Control Measure

- Highway System/Congestion Relief
  - Signal Interconnection
  - Bottleneck Elimination
  - Incident Management Programs
- Transit System Enhancements
  - Commuter Parking Lots
  - Subscription Bus Service/Vanpool Programs
  - Multi-modal Transit Centers
  - System Operational Improvements
- Non-Motorized Transportation
  - Bicycle Facilities
  - Pedestrian Facilities

STRATEGY 4 - 2007 MANDATORY MEASURES PLUS

All Strategy 2 measures plus:

POINT SOURCE VOC CONTROLS

Degreasing Controls
Improved Rule Effectiveness
Phased Emissions Reduction Program (Declining Emission Caps)

Table 4.a cont.

AREA SOURCE VOC CONTROLS

Agricultural Pesticides Application
Degreasing Controls
Improved Rule Effectiveness
Small Engine Buy-Back Program
Stage I - Equipment Efficiency Increases
State II - Equipment Efficiency Increases

POINT SOURCE NOx CONTROLS

Phase II Acid Rain NOx Limits

MOBILE SOURCE CONTROLS

Californian Low Emission Vehicle Standards
Specific Vehicle Inspection/Maintenance in the severe nonattainment areas
Reformulated Gasoline - Phase II (Class B) in the severe nonattainment areas

Table 4.b
Emission Control Measures in Indiana

STRATEGY 2 - 2007 MANDATORY CLEAN AIR ACT MEASURES

POINT SOURCE VOC CONTROLS
Batch Processes RACT
Industrial Wastewater RACT
Marine Vessel Volatile Organic Liquid Loading Controls
Metal Coil Coating Controls Tightening
Paper Coating Controls Tightening
Synthetic Organic Chemical Manufacturing Industry Reactor Processes
Wood Parts Coating
Coke Oven NESHAP
Large Gasoline Storage
Metal Can Coating Controls Tightening
Offset Lithography
Plastic Parts Coating Controls Tightening
Volatile Organic Liquid Storage RACT
Plant Shutdowns (Inland Steel Coke Batteries, Gary Incinerator, and Some Processes at Keil Chemical)

POINT SOURCE NOx CONTROLS
Phase I Acid Rain NOx Limits

AREA SOURCE VOC CONTROLS
Automobile Refinishing
Architectural and Industrial Maintenance Coatings
Marine Vessel Volatile Organic Loading
Municipal Waste Landfills
Open Burning Ban
Gasoline Tank Truck Leak Reductions (due to use of reformulated gasoline)
Stage I Refueling Reductions (due to use of reformulated gasoline)
Stage II Refueling Vapor Recovery
Underground Storage Tank Breathing Losses and Leaks (due to use of reformulated gasoline and improved valves)
Commercial/Consumer Solvent Reformulation or Elimination
Off-Road Engine Standards
On-Board Vehicle Controls

Table 4.b cont.

MOBILE SOURCE CONTROLS

Tier I Light-Duty Vehicle Standards
Reformulated Gasoline - Phase II (Class C)
Enhanced I/M (no NOx cut-points)
Clean Fuel Fleets
Current Transportation Improvement Program/Build Scenario
Northwest Indiana Regional Transportation Plan, including the following elements:

- Programs For Improved Public Transit
- Employer-Based Transportation Management Plans
- Traffic Flow Improvement Programs
- Fringe and Transportation Corridor Parking Facilities Serving Multiple Occupancy Vehicle Programs
- Programs for Secure Bicycle Storage Facilities and Other Bicycle Programs, including Bicycle Lanes

STRATEGY 4 - 2007 MANDATORY MEASURES PLUS

All Strategy 2 measures plus:

POINT SOURCE VOC CONTROLS

Improved Rule Effectiveness
Phased Emission Reduction Program

AREA SOURCE VOC CONTROLS

Agricultural Pesticides Application Controls
Degreasing Controls
Graphic Arts
Improved Rule Effectiveness
Petroleum Dry Cleaning Regulations
Small Engine Buy-Back Program

POINT SOURCE NOx CONTROLS

Phase II Acid Rain NOx Limits

MOBILE SOURCE CONTROLS

California Low Emission Vehicle Controls
Specific Vehicle I/M (no NOx cut-points)
Reformulated Gasoline - Phase II (Class B)

Table 4.c
Emission Control Measures in Wisconsin

STRATEGY 2 - 2007 MANDATORY CLEAN AIR ACT MEASURES

POINT SOURCE VOC CONTROLS
Asphalt Production Plants
Industrial Adhesives
Iron and Steel Foundries RACT
Miscellaneous Wood Product Coating
Degreasing Controls
Industrial Solvent Cleanup RACT
Large Gasoline Storage
Offset Lithography
Plastic Parts Coating Tightening
Wood Furniture Coating RACT
Screen Printing RACT
Yeast Manufacturing RACT

POINT SOURCE NOx CONTROLS
Acid Rain Phase I NOx Limits

AREA SOURCE VOC CONTROLS
Automobile Refinishing
Degreasing Controls
Solid Waste Toxic Substance Disposal Facility MACT
Stage II Vehicle Refueling Vapor Recovery
Reformulated Gasoline Use in Off-Road Vehicles
Traffic Marking Reformulation or Solvent Control
Wood Furniture Coating Tightening
Architectural and Industrial Maintenance Coatings
Municipal Waste Landfills
Stage I Refueling Reductions Due To Use of Reformulated Gasoline
Gasoline Tank Truck Leak Reductions Due To Use of Reformulated Gasoline
Underground Tank Breathing Losses and Leak Control Due To Use of Reformulated Gasoline
Commercial/Consumer Solvent Reformulation or Elimination
Off-Road Engine Standards
On-Board Vehicle Controls

Table 4.c cont.

MOBILE SOURCE CONTROLS

Tier I Light-Duty Vehicle Standards
Reformulated Gasoline - Phase II (Class C)
Enhanced I/M (no NOx cut-points)
Clean Fuel Fleets
Current Transportation Improvement Program/Build Scenario
Long Range Transportation Plan, including the following elements:

- Full implementation of adopted Land Use Plan and promotion of land use and urban design elements that encourage alternatives to automobile commuting
- Public Transit Service Improvements with a Phase-In 75 Percent Increase in Service by 2010
- Transportation Demand Management Measures that Support Employee Commute Options Program Goals, including: Ridesharing; telecommuting; Transportation Management Associations; and Alternative Work Schedule Promotion
- Freeway Traffic Management Plan Implementation
- Highway Improvements - Congestion Mitigation

2010 Transportation System Plan Recommended Transportation Control Measures

STRATEGY 4 - 2007 MANDATORY MEASURES PLUS

All Strategy 2 measures plus:

POINT SOURCE VOC CONTROLS

Improved Rule Effectiveness
Phased Emission Reduction Program

POINT SOURCE NOx CONTROLS

Phase II Acid Rain NOx Limits

AREA SOURCE VOC CONTROLS

Agricultural Pesticides Application
Degreasing Controls
Improved Rule Effectiveness
Offset Lithography
Petroleum Dry Cleaning
Small Engine Buy-Back Program

Table 4.c cont.

Stage II Vehicle Refueling - Eliminate Small Business
Exemption

MOBILE SOURCE CONTROLS

California Low Emission Vehicle Controls
Specific Vehicle I/M (no NOx cut-points)
Reformulated Gasoline - Phase II (Class B)

Have the States adopted the selected emission control strategies?

The States have not selected either emissions control strategy as the official, adopted emissions control strategy of the Phase II ozone attainment demonstration. The States, however, have adopted and developed regulations for many of the emission control measures contained in the two emission control strategies, and particularly for the controls contained in Strategy 2. Some of the emission control measures in Strategy 4, however, have not been adopted. For example, Wisconsin and Indiana have not adopted Phased Emission Reduction Programs (capped emissions with declining emission caps) and all three States have not adopted major agricultural pesticide application restrictions.

6. Transportation Conformity

Did the States address transportation conformity in the submittals?

The three States have not specifically addressed transportation conformity or associated mobile source emission budgets in the attainment demonstration submittals and no such mobile source emission budgets have been adopted as part of the Phase II submittals.

7. State Commitments

Are there any State commitments for further analyses and air quality plans addressing a final ozone attainment demonstration for the one-hour ozone standard?

The States of Illinois, Indiana, and Wisconsin have made the following state-specific commitments:

- **Illinois**

  Illinois commits to complete the post-1999 ROP plan, including target level calculations and identification of all necessary emission control measures that demonstrate that the remaining ROP milestone emission target level will be achieved through attainment of the one-hour ozone standard. This plan will be submitted to the Environmental Protection Agency no later than the end of 2000. Illinois,

however, will reevaluate the need for additional VOC emission reductions after it has assessed the full impact of the NOx state implementation plans, expected to be submitted in 1999.

Illinois is committed to meet the necessary requirements for attaining the one-hour standard. The State will implement the control programs necessary to meet ROP and to attain the standard.

- **Indiana**

Indiana commits to complete the post-1999 ROP plan. Indiana is currently developing emission control measures for inclusion in the 2002 ROP plan. The State has documented the chronology of state implementation plan actions for Lake and Porter Counties. This chronology includes a December 2000 entry for ROP plans meeting ROP requirements in 2002, 2005, and 2007 to bring the area into attainment of the one-hour ozone standard.

After reviewing the impact of regional NOx emission controls on the Lake Michigan area, Indiana commits to adopting any further measures that are required to bring the area into attainment of the ozone standard.

- **Wisconsin**

Wisconsin believes that, with the level of NOx emission reductions consistent with the NOx state implementation plan call and considering the VOC emission reductions from the 15 percent (1996) and 9 percent (post-1996) ROP plans, little or no additional VOC emission reductions are necessary to provide for attainment of the one-hour ozone standard. Wisconsin, however, is committed to submitting a plan, including adopted emission control regulations, to achieve attainment of the one-hour standard and to meet post-1999 ROP requirements. This plan will be submitted to the Environmental Protection Agency no later than the end of 2000. After the full impact of the NOx state implementation plan call is assessed, Wisconsin will reconsider the need for further VOC emission controls. If additional VOC control measures are needed, Wisconsin will revise the state implementation plan to include the necessary regulations.

Wisconsin commits to implement the emission control programs on a schedule necessary to meet ROP requirements and to implement NOx emission controls consistent with the compliance schedule contained in the final NOx state implementation plan call.

C. ENVIRONMENTAL PROTECTION AGENCY REVIEW OF THE SUBMITTALS

1. Adequacy of the States' Demonstration of Attainment

Did the States adequately document the techniques and data used to derive the modeling input data and modeling results of the analyses?

The Phase I submittals from the States thoroughly document the techniques and data used to derive the modeling input data. The Phase II submittals adequately summarize the modeling outputs and the conclusions drawn from these model outputs.

Did the modeling procedures and input data used comply with the Environmental Protection Agency guidelines and Clean Air Act requirements?

Yes.

Did the States adequately demonstrate attainment of the ozone standard?

The States, in accordance with the Environmental Protection Agency December 1997 guidance, have demonstrated that attainment of the standard is achievable provided sufficient reductions in background ozone concentrations (and background ozone precursor concentrations) occur as a result of the implementation of regional NOx emission controls under the NOx state implementation plan call. The States, however, have not selected a specific emission control strategy that would achieve attainment of the one-hour ozone standard. This will not be done until the States submit a final attainment demonstration in December 2000. By then the States plan to complete the assessment of the ozone impacts of the NOx state implementation plan call and to adopt additional VOC emission control measures needed to attain the one-hour standard (at this time no additional local VOC emission controls are anticipated).

Given the uncertainties of the impacts of the NOx state implementation plan call (including the impacts of the indefinite stay on the NOx state implementation plan call imposed by District of Columbia Circuit Court of Appeals), the States can not be expected to finalize the selection of the attainment demonstration emissions control strategy at this time. The attainment demonstration, however, can not be judged to be fully adequate until after the States have submitted the final attainment demonstration in December 2000.

Did the weight-of-evidence test support the States' conclusions regarding the attainment demonstration?

The documented weight-of-evidence analyses support the conclusions of the deterministic test and the statistical test. Both the deterministic test and the statistical test lead to similar conclusions regarding the ozone standard attainment demonstration.

2. Adequacy of the Emissions Control Strategy

Has an adopted emissions control strategy been adequately documented?

No. The States have not adopted a final emissions control strategy for attainment of the one-hour ozone standard. The States, however, have demonstrated that significant reductions in ozone transport levels will be necessary to attain the one-hour standard. These reductions are expected to occur as a result of the implementation of regional NOx emission reductions. All three of the States are expected to submit NOx state implementation plans to address the Environmental Protection Agency NOx state implementation plan call. To date, the Sates have not adopted and submitted the NOx emission control regulations needed to comply with this emission reduction requirement. The final ozone attainment demonstration, if based in part on regional NOx emission reductions, should not be approved for any State failing to submit an approvable NOx emission control plan.

Are the emission control strategies acceptable?

No. The States, however, have committed to adopt and submit the required emission control strategies by December 2000. See below.

3. State Commitments

Are the State commitments for future analyses and finalization of the attainment demonstration acceptable?

Yes. Given that States need to further consider the impacts of the NOx state implementation plan call before finalizing the selection and adoption of the ozone attainment emissions control strategy and that the Environmental Protection Agency has yet to give the States the data to complete that process, it is appropriate to give the States additional time to complete this process. The States' commitments to complete this process and to adopt and submit post-1999 ROP plans by December 2000 are adequate.

4. Relationship To Other Requirements

Will the future analyses adequately address the impacts of the Environmental Protection Agency NOx State Implementation Plan call?

Yes. In fact, the future analyses will heavily depend on the impacts of the NOx state implementation plan call (assuming the stay against the NOx state implementation plan call is ended and the Court has not overturned the NOx state implementation plan call). The States have made it very clear that the one-hour ozone standard can not be attained without the regional NOx emission reductions.

How is the existing Oxides of Nitrogen emissions control waiver affected by the ozone modeling conclusions and the ozone attainment demonstration?

This issue was not adequately addressed in these submittals. In assessing the impacts of future NOx emission reductions, the States assumed region-wide or ozone nonattainment area-wide NOx emission reductions. It is impossible from the data presented to draw any conclusions regarding the continuing validity of the existing NOx emission reduction waiver in the ozone nonattainment areas. It is noted, however, that the submittals do note the disbenefits of NOx emission reductions within the Chicago ozone nonattainment area. The States have requested further Environmental Protection Agency assistance in addressing this issue.

Until the States finalize the ozone attainment demonstration in

December 2000, further conclusions regarding the NOx emission reduction waiver are impossible, and the waiver continues to stand. The States need to specifically address this issue as part of the final ozone attainment demonstration. The Environmental Protection Agency will work with the States to further address this issue.

Have the States specified and adopted acceptable transportation conformity budgets?

No.

Do the State submittals contain emission control contingency measures as required under sections 172(c)(9) and 182(c)(9) of the Clean Air Act?

No.

D. SUMMARY

Overall, is the States' ozone attainment demonstration acceptable?

Given the uncertainties of the impacts of the NOx state implementation plan revisions (required to be submitted by most States in the eastern half of the United States by September 30, 1999 but likely to be delayed due to an indefinite stay imposed by the District of Columbia Circuit Court of Appeals), Illinois, Indiana, and Wisconsin have accomplished as much as can be expected at this time and have met the requirements of the Environmental Protection Agency December 1997 one-hour attainment guidance. Therefore, even though the States have not completed the attainment demonstration process, this should not be taken as a basis to disapprove the attainment demonstration submittals. The States should be given adequate time to fully assess the impacts of the NOx state implementation plan call and to integrate these impacts into the selection of the final ozone attainment demonstration.

What portions of the attainment demonstration need additional work and consideration in the final attainment demonstration?

The following items need further consideration in the final ozone attainment demonstration:

- Assessment of the impacts of regional NOx emission reductions;
- Selection of a final emissions control strategy;
- Assessment of the continued validity and impacts of the section 182(f) NOx emissions control waiver;
- Final demonstration of attainment, including modeling incorporating the impacts of the regional NOx emission reductions, local control measures, and NOx emissions control waiver (if maintained);
- Transportation conformity emission budgets; and
- Selection of contingency measures to comply with the requirements of sections 172(c)(9) and 182(c)(9) of the Clean Air Act.

What rulemaking action is recommended for these submittals?

It is recommended that the Environmental Protection Agency propose conditional approval of the ozone attainment demonstrations as a whole. Final approval of the attainment demonstrations would not occur until after the Environmental Protection Agency has reviewed the final attainment demonstrations expected to be submitted in December 2000.

At the time of the writing of this technical support document, the Environmental Protection Agency was considering how to address the lack of transportation conformity emission budgets in agreement with the

ozone attainment demonstrations. The possibility of disapproving the attainment demonstrations has been considered. Assuming the Environmental Protection Agency finalizes the disapproval of ozone attainment demonstrations on this basis, it is recommended that the attainment demonstrations be disapproved only in part. The remainder of the attainment demonstrations is adequate to warrant proposed approval. It should

additionally be noted that the States can not be expected to finalize transportation conformity budgets until they finalize the ozone attainment demonstrations in December 2000.

Also at the time of the writing of this technical support document, the District of Columbia Circuit Court of Appeals had issued an indefinite stay against the NOx state implementation plan call. If this stay is not ended and States (including those upwind of the Lake Michigan area) have not adopted NOx state implementation plans consistent with the NOx state implementation plan call by the time Illinois, Indiana, and Wisconsin finalize the ozone attainment demonstrations, the States must select and adopt additional emission controls to compensate for the lost NOx emission reductions. Otherwise, the Environmental Protection Agency should disapprove the ozone attainment demonstrations.